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COMMUNICATIONS

GLIOMA RETINAE*

A Statistical Survey of New Cases at the Royal London Ophthalmic Hospital (Moorfields Eye Hospital)

BY

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New Delhi, India

A STUDY of all cases of glioma retinae treated at Moorfields Eye Hospital since 1871 was initiated by Lawford and Collins (1890) and subsequently maintained by Marshall (1897), Owen (1905), Berrisford (1916), and Davenport (1926). A further review of 76 patients who attended the Hospital between January, 1925, and December, 1947, is presented here. Certain new facts regarding the aetiology, histopathology, and treatment of this condition have come to light.

Aetiology

Although several authors have experimentally obtained the formation of rosettes, nothing definite is yet known in relation to

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the immediate or remote causes of glioma. There are two instances in the present series with a history of trauma and six cases had a definite history of previous exanthemata. The exact role of trauma and exanthemata in the causation of glioma, however, is still very uncertain.

The possibility of some type of disease in the expectant mother as an exciting factor, *e.g.*, rubella, must be borne in mind.

Incidence

Of all the admissions to the hospital during the past 22 years cases of glioma retinae formed only 0·0063 per cent.

Age.—The exact date of onset of glioma is difficult to ascertain, but the following observations may be made:

Year	Percentage
1st	46 (Including 8 per cent.
2nd	25 noted at birth)
3rd	16
Later	12

These findings are in accordance with all the previous reports at the hospital.

The oldest case recorded was that of a patient who came at the age of 7 years and six weeks, which is in fact the oldest case recorded since 1871. Seven years can, as a rule, safely be taken as the limit for the occurrence of glioma, although several older cases appear in the literature.

In the bilateral cases again the maximum incidence was in the first year and next in the second year. It is interesting to note that none of the bilateral cases showed the first incidence after the age of three years, a fact strongly pointing to the congenital basis of glioma and more so of the bilateral ones. There were four examples in which both eyes were affected at birth, and the most interesting feature is that of the six cases in which glioma was noted at birth, four were bilateral.

Eye Affected.—Right	33	per cent.
Left	29	per cent.
Bilateral	37	per cent.

The bilateral incidence in this series is rather higher than in some others. A careful previous history and follow-up over a sufficiently long period perhaps accounts for this.

The longest interval in the occurrence of the growth in the two eyes has been three and a half years, as against the three years suggested by Collins (1892, 1895).

Heredity.—Whereas a number of cases of familial and hereditary influence on the occurrence of glioma are recorded by different authors, the present series has failed to bring to light any marked influence of this nature. Of the only two instances, one is an example of vertical transmission and the other of horizontal transmission. Since 1871 there have been only three instances at the Moorfields Eye Hospital out of 286 cases (*i.e.*, about 1 per cent.), who gave a positive history of familial glioma, a conclusion quite contrary to the reports of other authors.

Sex.—This seems to have little effect on the occurrence of glioma. There were 41 male and 35 female children.

Symptomatology

The clinical features come under notice only when the condition becomes sufficiently advanced. About 60 per cent. of cases came with " amaurotic cat's eye ", and the remainder with squint,

nystagmus, inflammation of varying degree, altered size of the eyeball, or general symptoms.

On examination, a dilated and inactive pupil was present in 50 per cent., raised intra-ocular tension in 31·5 per cent., and abnormal anterior chamber (absent, shallow, or irregular) in 30 per cent.

Histo-Pathology

Some interesting facts have emerged from the study of the histology :

(1) *Nature of Glioma.*—Retinoblastoma was present in 35 per cent., neuro-epithelioma in 16 per cent., and a mixed content in 36 per cent. of these cases. Thirteen per cent. remained undetermined.

(2) *Retinal Growth and Retina.*—In its earliest stages even the histological examination of the excised eye cannot, with any degree of certainty, reveal the clinical type of glioma and most of the neoplastic infiltration appears to occur in the plane of the retina, thus virtually increasing the incidence of glioma planum. Glioma endophytum was present in 21 per cent. of cases, glioma exophytum in 46 per cent. (*i.e.*, it was twice as common as glioma endophytum), and 15 per cent. showed a mixed nature. In the remaining eyes this detail could not be ascertained.

In 60 per cent. there was a retinal detachment, half of them total.

(3) *Choroidal Infiltration* (Fig. 1).—In this series the choroid was found infiltrated in eight eyes (10·5 per cent.) with some doubt as to its involvement in another case. Seedlings were present on its surface in two instances, probably indicating a stage prior to its involvement. There is no specified time in the

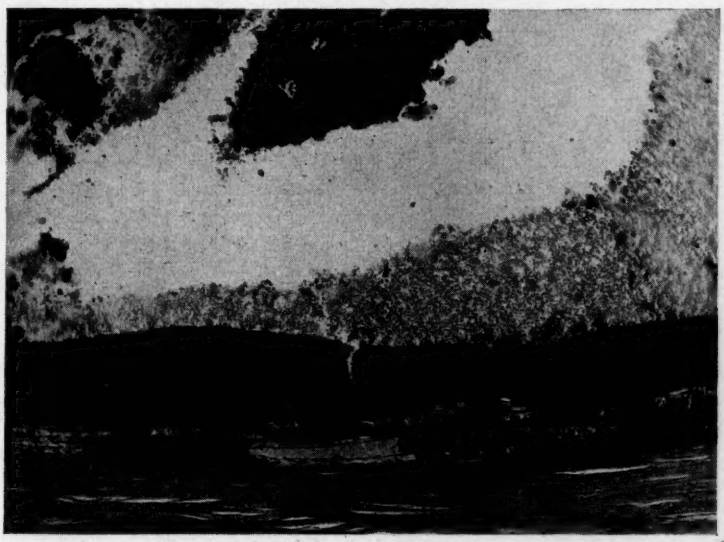

FIG. 1.—Choroidal infiltration (pigment epithelium eaten up).

process of spread when the choroid becomes involved, and in almost all these cases the retinal growth was not particularly extensive. On the other hand, in eighteen eyes the retina was found to be totally or very extensively destroyed by glioma without any choroidal invasion. That the extent of the retinal neoplasm is not the determining factor in the secondary invasion of the choroid is certain from this observation. Further, in each of the eyes showing choroidal infiltration or its threatened invasion, glioma was of the exophytum type, except in one case where it was of a mixed nature. This points to implantation through the sub-retinal fluid as the commonest mode of spread to the choroid. Glioma cells lying upon the pigment epithelium seem to eat their way through it and affect the choroid.

(4) *Infiltration of the Optic Nerve.*—The optic nerve has been suggested as being next to the choroid in frequency of involvement. In this series, however, the optic nerve was invaded in 24 eyes (31·5 per cent.), as against nine cases of choroidal involvement. In five cases both the choroid and the nerve were affected and it cannot be said which was the first to be involved. The rest of the nineteen eyes showed involvement of the nerve only. The optic nerve was affected in the following ways:

(*a*) disk only, sixteen eyes;
(*b*) up to the lamina cribrosa, five eyes (Fig. 2);
(*c*) beyond the lamina cribrosa, three eyes (Fig. 3).

In four eyes a deposit of glioma cells was present on the surface of the disk without the nerve being actually affected, which perhaps indicated the first step in the process of dissemination.

(5) *Vitreous.*—In all eyes examined in this series except one, the vitreous was degenerated, and the fluid vitreous contained clumps of glioma cells.

(6) *Iris and Ciliary Body.*—Seedlings of glioma cells were present on the ciliary body in two instances (Fig. 4), and were found in the anterior chamber, on the

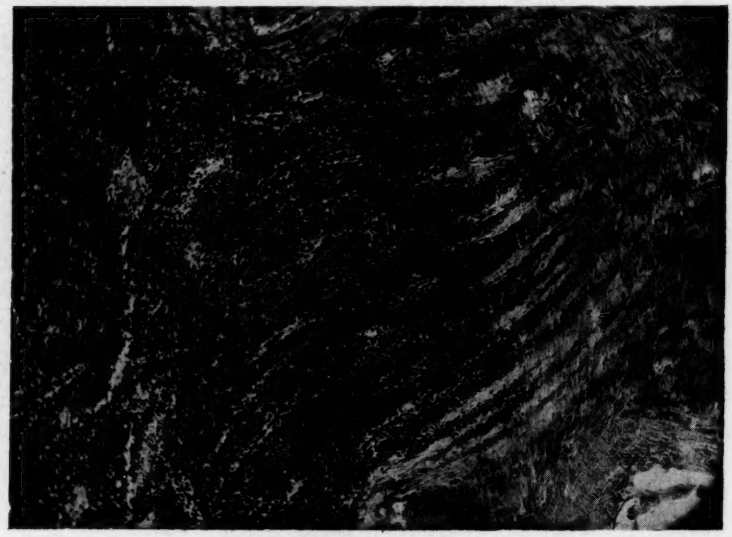

FIG. 2.—Infiltration of optic nerve up to lamina cribrosa.

FIG. 3.—Infiltration of optic nerve beyond lamina cribrosa.

FIG. 4.—Glioma clusters on ciliary body, in posterior chamber, in front of iris, and on back of cornea.

FIG. 5.—Glioma nodule on anterior surface of iris.

back of the cornea, in front of the iris (Fig. 5), and/or on the anterior lens capsule in twelve eyes (16 per cent.). Similarly, inflammatory reaction by way of keratic precipitates, cells or exudates in the anterior chamber, and/or cellular infiltration of the uvea or posterior synechiae were present in 54 eyes (71 per cent.).

(7) *Lens.*—Wintersteiner (1897) found only three cases out of 32 in which the lens was normal, flat anterior polar cataract having formed in one-fifth of his cases. In the present series the lens showed no particular damage. Complicated cataract was present in two eyes and undefined degenerative changes in one.

(8) *Sclera.*—This was involved in one case only near the disk.

(9) *Globe.*—There were two instances where the eye shrank after degeneration without perforation—one after radiation and the other spontaneously—both of which contained largely necrotic and calcareous gliomata (Figs 6 and 7). In two other instances there was a perforation and subsequent shrinking (Fig. 8), but since the eyes were removed immediately the sequelae could not be studied.

Difference between Unilateral and Bilateral Glioma

Cumings and Sorsby (1944), in ascribing to the site of origin of glioma the possible histological differences, said that the unilateral neoplasms appeared to arise rather from the outer nuclear layer, and bilateral ones from the inner layer only or from both.

In this series, a statement as to the exact sites of origin of the neoplasm was given by the pathologist in very few instances. A study of these slides showed that in the majority the tumour was so much advanced that it was not possible to determine the exact

FIG. 6.—Calcareous deposits in glioma retinae.

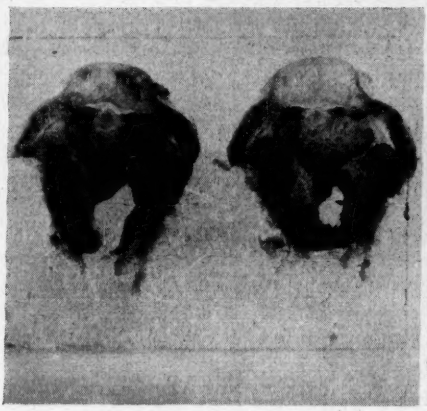

FIG. 7.—Spontaneous shrinking.

FIG. 8.—Shrinking after perforation.

site of origin. A definite opinion could be given in the cases set out in Table I (overleaf).

Whereas the single factor of a greater number of bilateral gliomata arise from the inner nuclear layer favours the opinion

of Cumings and Sorsby, the remaining three factors, being no less significant, are against it. The number under consideration is not large, but certainly opens a new line for investigation. It is necessary that several sections should be examined at the time of making the first report and a definite note should be made about the layer which appears to be the site of origin.

TABLE I
Site of Tumours

Tumours	Site of Origin		Total
	Inner nuclear layer	Outer nuclear layer	
Unilateral	3	1	4
Bilateral	6	3	9
Total	9	4	13

Treatment

Table II gives the line of treatment adopted for these cases and the results obtained.

TABLE II
Treatment and Results

Treatment	Results				
	No. treated	Permanent recovery	Alive but not cured	Not traced	Failure
Unilateral enucleation ...	46	21	1	24	0
Bilateral enucleation ...	11	3	—	8	0
Enucleation followed by exenteration on the same side...	1	1	—	—	0
Enucleation on one side and exenteration on the other side...	1	—	—	—	1 dead
Enucleation on one side and radiation on the other ...	17	5	1	1	10* (1 died on table)
*of remaining nine enucleated ...		5	—	4	
Total	76	35	2	37	2 dead

It is clear from this study that enucleation offers the best chances for a permanent recovery and the results of radiation have not been particularly encouraging. The best results were obtained with radium treatment (about 36 per cent. cure) and deep *x* ray proved a complete failure. One case treated with a diathermy barrage around the tumour showed a good reaction, but could not be followed up.

Where the choroid is involved it is suggested by certain authors that some orbital extension may have taken place even in the absence of apparent clinical evidence, and that exenteration or the less drastic treatment of radiation should be employed. In this series all the nine cases showing choroidal infiltration were treated by enucleation only; no post-operative radiation was given to any case and none is reported to have developed a recurrence. This shows that no matter what the involved tissues are, as long as the neoplasm is strictly intra-ocular, enucleation alone offers as good a chance of recovery as enucleation followed by radiation. If, on the other hand, there is definite clinical evidence at the time of enucleation, or histological evidence later, that secondaries are present outside the eye, nothing short of exenteration combined with radiation should be considered a complete treatment.

A combined intracranial and orbital operation for bilateral retinoblastoma has been suggested by Jean (1922). Ray and MacLean (1943) justify such a drastic course by arguing that the survival rate of the classic enucleation with resection of the maximum portion of the optic nerve is found as low as 35 per cent. and as high as 57 per cent., *i.e.*, in 65 per cent. of the first and 43 per cent. of the second, the operation was a failure. Reese (1931), however, is of the opinion that the intracranial operation is unnecessary.

Considering the 76 cases here, the drastic so-called foolproof treatment appears to be unnecessary. In 24 eyes only out of the 104 affected with glioma was there involvement of the optic nerve. Thus, if this operation had been undertaken as a routine in every instance, it would not have been worth while in eighty eyes (77 per cent.). Further, out of these 24 eyes with optic-nerve involvement, there was positive evidence of extension of the neoplastic infiltration beyond the point of section in one instance only, although there were orbital metastases in two others also. This shows that although the tumour is known to spread along the nerve quite early, yet if the longest possible piece of the optic nerve is excised along with the globe at the earliest opportunity one can be more or less certain of leaving no residual tumour behind. Thus in three instances only was there a justification

for undertaking the combined operation, and the necessity for it could not be established until the eye was removed and the stump of the nerve sectioned. Of these three cases, one was treated by exenteration and showed a permanent recovery, another died in spite of exenteration because of the delay in obtaining consent for a bilateral enucleation, and one case remains untraced. Clinically it is impossible to decide whether the optic nerve is involved or not, and if so how far. In view of the added risk of the intracranial operation and all its involved complications, it is worth considering to what extent the combined intracranial and orbital operation is justified.

Ill-Effects and Complications of Radiation

One or more of the following damaging effects were met with in our cases:

Skin.—Hyperaemia, oedema, destruction and falling of lashes—two cases.

Conjunctiva.—Acute conjunctivitis in one case, complete symblepharon in one, and degenerative changes in one. Transient oedema and hyperaemia are of frequent occurrence.

Cornea.—This first became hazy, then opaque, and sclerosed in one case. Infiltration, ulceration, and ultimate perforation occurred in two cases. The cornea is relatively radioresistant and the commonest occurrence therein is a temporary clouding only.

Lens.—Posterior lenticular opacities were present in three cases. In this series the maximum time was two years when the earliest opacities were first noticed in one case, and five years later a generalized sclerosis was present. In another case the earliest opacities were noted 17 months after radiation, and a more marked star-shaped opacity was found four and a half years afterwards in the posterior cortex. It is evident from this, that the changes giving rise to opacification start after a considerable length of time and progress slowly. The average time mentioned, however, is three years.

Panophthalmitis.—This was caused by radiation in two instances.

Prognosis

Prognosis depends upon the stage when the treatment is commenced, the type of treatment employed, and the completeness with which the entire neoplasm is eradicated. The survival rate reported by Hirschberg (1868) was 5 per cent., Wintersteiner (1897) 17 per cent., Parkhill and Benedict (1941) 35 per cent., Adam (1911) 57 per cent., and Reese (1931) 57 per cent. In the present series the results were as follows:

Results	Percentage
Known deaths	2·6
Known permanent recoveries	46·0
Spontaneous retrogression	2·6
Living, but treated less than three years ...	2·6
Untraced (but no record of death found) ...	48·7

In bilateral cases, the prognosis is supposed to be worse, but this was not so in the present series. Of 28 bilateral cases, twelve recovered permanently, one died, one is alive two and a half years after the treatment, and fourteen cases remain untraced.

After extra-ocular extension has occurred through the optic nerve or the sclera the outlook is reported to be very grave and recurrences are thought to be more common in them. In our cases, out of the 24 with nerve involvement twelve are known to have permanently recovered and twelve are untraced. The sclera was found to be affected in one instance which remained untraced. Recurrence was found in four instances—in one in the eye itself, and in three cases in the orbit. Only one case showed extension of the neoplastic infiltration beyond the point of section, and that case developed recurrence in the orbit but survived, and one case died of what was diagnosed as the sarcoma of the maxilla. It is evident that, no matter how far in the orbit the neoplasm may have extended, as long as the malignant infiltration is strictly confined to the orbit and the infiltrated areas can be removed completely, there is a good prognostic outlook. If, on the other hand, any infiltrated portion of the optic nerve or the orbital tissue is left behind at the time of excision, a fatal issue would be imminent.

In the absence of death certificates at the office of the Registrar-General, a high proportion may be presumed as survivors. With early surgery and with improved technique, the prognosis has unquestionably become much better.

I wish to express my thanks to Mr. Robert C. Davenport, Dean of the Institute of Ophthalmology, London, for his advice and help; to the surgeons of the Moorfields Eye Hospital for permitting me to quote their cases; to the members of the staff of the Registrar's Office, the Office of the Medical School, and the Department of Pathology, Moorfields Eye Hospital, for help in tracing case notes and collecting data; to Mr. E. V. Willmott, A.R.P.S., of the Post-Graduate Medical School of London for the photomicrography; and to the University of Lucknow, India, for permission to publish these abstracts.

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SUPERFICIAL PERILIMBAL VESSELS IN THE NORMAL AND CONGESTED EYE*

BY

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From the Institute of Ophthalmology, London

ON examining the normal white eye with a 20x or 40x power of the slit-lamp microscope, the vascular pattern of the superficial vessels of the corneo-scleral junction is not readily made out. The vessels of the perilimbal conjunctiva are in the form of straight, slender, radially directed channels in which the flow may be either towards or away from the cornea. The vessels forming the marginal corneal loops present even greater difficulty, since well over half of the available channels are completely empty of blood and the remainder have an extremely fine column in which the flow may vary in direction as neighbouring capillaries open up or contract.

If, however, the eye is examined when in the congested state, especially if in the deep or ciliary type, the anatomy of the superficial vessels can be much more clearly seen. It will be apparent later why the superficial vessels should be involved in a deep congestion, but for the moment it is sufficient to state that when the globe is congested all the blood channels are filled, and the distinction between even the smallest arterioles and venules is made clear by the differences in their form and blood flow.

There is a close similarity in the anatomical plan of the vessels of the perilimbal conjunctiva and of the marginal corneal loops. The arterioles of both groups originate from arteries which lie deeply in the episcleral tissues within a millimetre of the limbus, and the veins of both groups drain deeply into the episcleral veins in the same region.

The arterioles of the perilimbal conjunctiva turn sharply forwards from their deep origins, and run outwards towards the fornices in all sectors, for a distance of 3 to 6 mm. The veins which drain the corresponding area flow, in most cases, towards the cornea, and just before the limbus they loop deeply to empty into the episcleral veins. Similarly the arterial limbs of the marginal loops are formed by twigs of the episcleral arteries and run towards the cornea. Blood is returned by collecting veins, which pass deep to the conjunctiva to drain into the veins of the episclera.

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The bulbar conjunctiva which lies more than 5 mm. from the limbus gets its blood supply from vessels lying in the region of the fornices. There is therefore a neutral ring of bulbar conjunctiva lying between the two systems.

Graves (1934), in studies on the white eye, demonstrated this arrangement of the perilimbal circulation in localized sectors. He also described the vascular connections of another, rather inconstant, series of minute vessels, the " palisade " vessels of Vogt. When present, these are best marked in the lower limbus and consist of a series of minute arterio-venous loops, some one millimetre in length, which are connected to the bases of the marginal corneal loops and run outwards for a short distance on the bulbar conjunctiva.

By observing and photographing the superficial vessels in congested globes and watching their changes during resolution, the anatomy of the vessels in the whole of the perilimbal area is further clarified. In addition, the close anatomical relationship which exists between the superficial and deep vessels has been found to have important consequences in pathological states. In deep ciliary congestions for example the dilatation of the episcleral arteries and the engorgement of the veins produce similar changes in the conjunctival vessels and corneal loops which originate from and drain into them. Moreover, alterations in the blood flow in the deeper vessels, such as active hyperaemia, venous engorgement, and partial or complete venous stasis, are usually associated with similar secondary changes in the superficial system.

The anatomy of the superficial perilimbal vessels will now be set out. The accompanying photographs show patients suffering from iritis of moderate severity, in which the congestion of the superficial vessels was secondary to the deep congestion and could not be attributed to conjunctival infection or irritation.

Arteries of the Perilimbal Conjunctiva

There are some 15 to 25 main arterioles which run in a radial direction towards the fornices from the limbal area for some 3 to 6 mm. before breaking up into their terminal capillaries.

The largest arterioles are found running from the upper part of the limbus and frequently do not have an accompanying vein (vessels A and B in Fig. 1 *a*, vessels B and C in Fig. 2). Smaller arterioles situated in the lower part of the limbal area are often associated with a vein, and it may be possible to trace the blood flow from the arterioles to the venules through the capillaries. A characteristic feature of these arterial vessels is

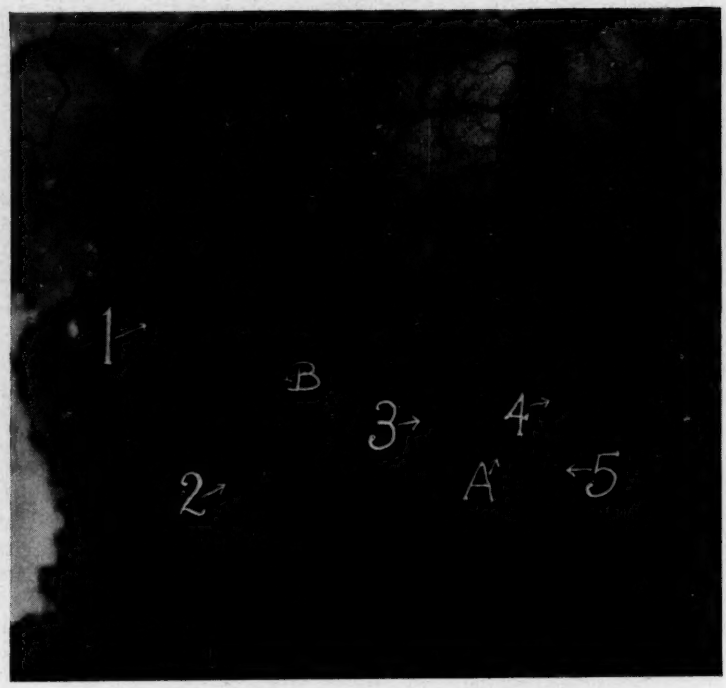

FIG. 1(*a*).—Acute iritis of moderate severity. Upper nasal limbus. 1, 2, 3, 4, 5, perilimbal conjunctival veins. A, B, perilimbal conjunctival arteries.

that they are usually only a quarter to one-third of the diameter of the corresponding veins.

As stated above, the vessels of origin of the arterioles lie deeply in the episcleral tissues immediately adjacent to the limbus, and probably in all cases derive directly from branches of the anterior ciliary arteries. In some instances it is possible to trace these branches from parent twigs, given off from the anterior ciliaries just before they penetrate the sclera and running towards the limbus in the episcleral tissues almost to the cornea, before giving off the conjunctival branch which loops sharply forward to run a recurrent course on the conjunctiva. Most of the superficial vessels, however, are given off by branches of the anterior ciliary arteries which lie more deeply in the episclera and cannot be traced back to their parent vessels.

The course of the arterioles is straight or slightly curved, and they tend to branch at acute angles. The blood flow is extremely

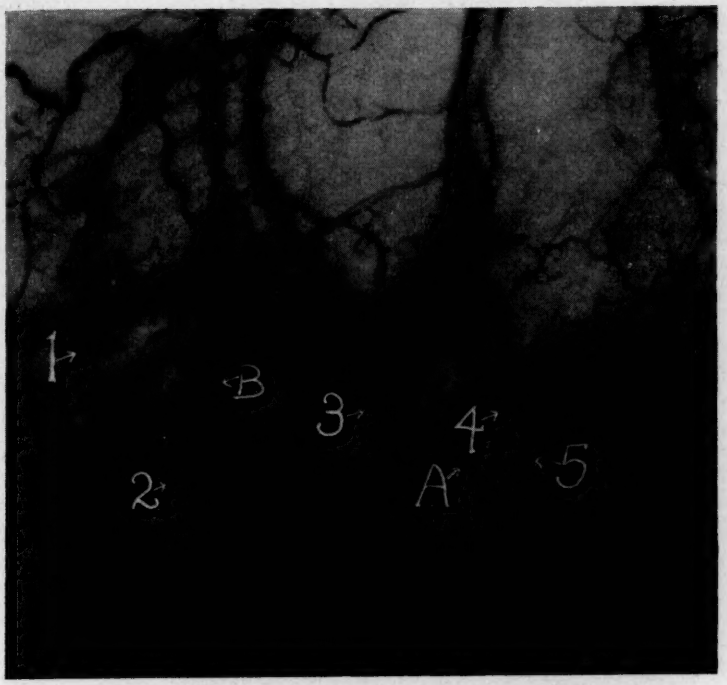

FIG. 1(*b*).—The same as Fig. 1(*a*) after resolution. Vessels numbered as in Fig. 1(*a*).

rapid and often " spurting " in character; it is easier to see in the smaller branches than in the main stems.

When the globe is in a state of ciliary congestion photographs show that the anterior ciliary arteries (and especially their branches) are greatly dilated. It has been shown by serial photographs taken from onset to resolution that even the most minute branches show no tortuosity and pursue exactly their original courses. Since in these conditions the veins undergo enormous dilatation and tortuosity, the identification of arterioles and veins is further simplified.

Veins of the Perilimbal Conjunctiva

The veins are rather more numerous than the arteries, and are the more conspicuous on account of their larger size and deeper colour. Those of the upper part of the perilimbal conjunctiva are larger than elsewhere, and can often be seen with the naked

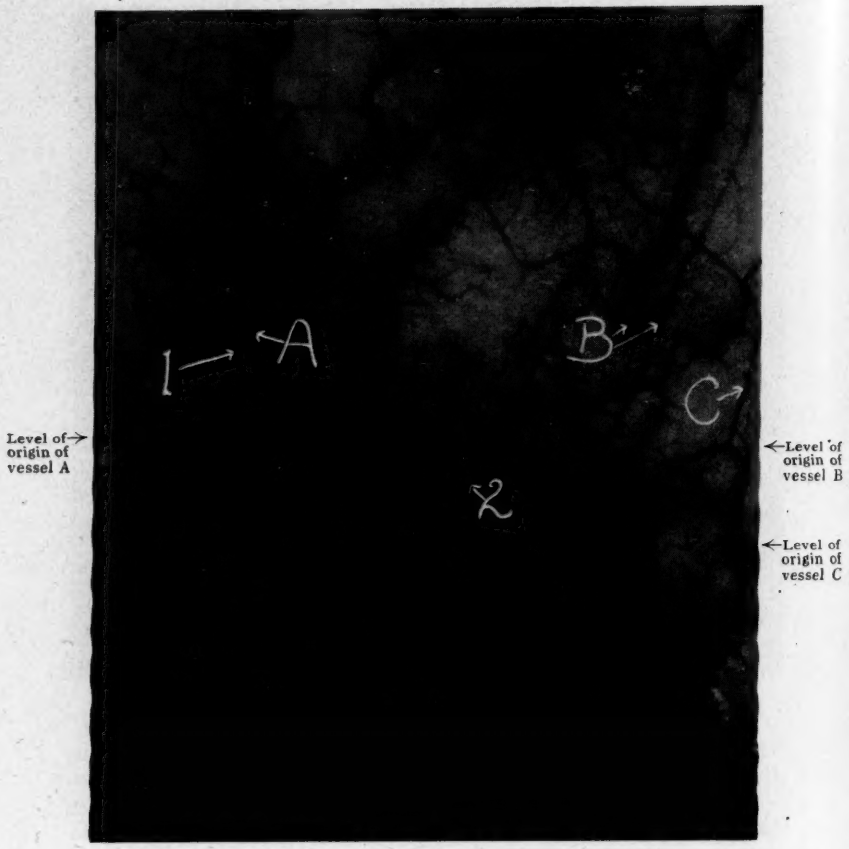

FIG. 2.—Resolving iritis. Upper nasal limbus. 1, 2, perilimbal conjunctival veins. A, B, C, perilimbal conjunctival arteries.

eye. They drain regions supplied by the corresponding arteries towards the cornea.

The individual veins are formed by a number of tributaries joining an elongated trunk which takes a slightly wavy course to the limbus. At a distance of about one millimetre away from the limbus they loop sharply backwards to empty into the episcleral veins. Some of the largest (vessel 1, Fig. 1*b*) give rise to quite sizeable episcleral veins.

In normal cases, 80 to 90 per cent. of the conjunctival veins

drain towards the limbus, but isolated sectors of perilimbal conjunctiva drain directly towards the fornices; this occurs most frequently in the lower temporal and the nasal areas.

When the eye is examined in a state of deep ciliary congestion (whether due to iritis, keratitis, or glaucoma), remarkable changes are found in the conjunctival veins. Even in slight congestions they increase greatly in calibre and tortuosity (compare Figs 1*a* and 1*b*), and in severe congestions the stems may be corkscrewed or even coiled. Fresh channels are opened up and the anastomoses between the perilimbal and peripheral groups of veins are easily seen. If the congestion is severe, the flow in some of the tributaries or even in the main stems may be reversed towards the fornices through these anastomotic channels.

Not only do these veins share in the venous engorgement when this is present in the deeper vessels, but if either partial or complete venous stasis exists there, similar changes are usually found in the conjunctival vessels. That these changes are not purely a reflex hyperaemia is shown by the behaviour of the perilimbal veins in other conditions. In chronic thrombotic glaucoma for instance, where the episcleral venous plexus is engorged by veins bringing blood at considerable pressure from the interior of the globe, this obstruction to their outflow causes a dilatation of the conjunctival veins.

Marginal Corneal Loops

The study of these loops is greatly facilitated when the minute vessels are congested and all the channels are opened up. The venous elements become apparent by their gross dilatation and sluggish blood flow, whereas the arterial limbs retain their fine calibre.

There are wide variations in the form of the loops. The simplest type, commonly found in the lower part of the limbus, consists of a thread-like arterial limb which forms a loop and then immediately dilates to become the venous limb (Fig. 1*a*). More complicated forms are often found in the upper limbus where the arterial twigs may form several loops at varying distances into the cornea. Some loops do not dilate in even the most severe congestions until a considerable way down the returning limb, and until dilatation occurs they are probably arterial.

The arterial limbs are derived from the episcleral arteries and, like those of the conjunctiva, can sometimes be traced from branches of the anterior ciliary arteries. The main vessels which supply the limbs often run along the line of the limbus, giving off their minute branches at right angles as they go. The arterial

limbs tend to lie deeper than the venous limbs, and it is usual to find several of the latter converging to form a collecting venule, which lies astride the limbus and then passes deep to the conjunctiva to empty into the episcleral veins (Fig. 1*a*).

In some sectors the loops empty into a superficial collecting vein which runs along the line of the limbus for several millimetres and then turns sharply away from the cornea to pass sometimes onto the surface of the conjunctiva and sometimes deep to it.

A rapid spurting flow can often be made out in the arterial channels. In the venous limbs the flow is much slower and frequently "granular", an appearance associated with a slow rate of flow (Knisely and others, 1947), which can easily be observed from the initial dilatation to the point where the collecting channels disappear under the conjunctiva.

Summary

A detailed account of the vascular arrangements of the perilimbal conjunctiva and of the marginal corneal loops has been made by observing and photographing the perilimbal region with the globe in a congested state.

The changes in form and blood flow in the superficial vessels is shown to be closely related to the deeper vessels from which they derive.

I wish to thank Sir Stewart Duke-Elder for his interest and helpful criticism, and Dr. Peter Hansell of the Department of Medical Illustration of the Institute of Ophthalmology for taking the photographs.

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DAVID'S AUTHORSHIP OF THE SO-CALLED SIE-BOEN-LIAN OPERATION FOR ENTROPION, AND SUGGESTED IMPROVEMENTS*

BY

E. RAUBITSCHEK

Baghdad

IN February, 1931, an article describing an operation for entropion by Sie-Boen-Lian appeared in the *Klinische Monatsblätter für Augenheilkunde*. It so happened that Dr. J. David, who was not an ophthalmic specialist but a general practitioner, had several years before shown me a copy of an article of his own on this very subject. I therefore drew his attention to Sie-Boen-Lian's communication, with the result that he claimed his rights as the originator of the technique in question, and two months later, in April, 1931, the following correction was published:

> The simple operative procedure for mass treatment of entropion . . . by Sie-Boen-Lian (Djokjakarta, Dutch East Indies) shows such extensive conformity with the method described in 1923 in *Arch. Ophtal., Paris*, **40**, 737, that the priority of the idea undoubtedly rests with the earlier author, Dr. J. David.

Meanwhile, I received a letter from Professor A. von. Szily, Editor of the *Klin. Mbl. Augenheilk.*, thanking me for my part in discovering the plagiarism. But the error proved more tenacious than the truth, and the operation went by the name of the second "inventor". Miric (1938) and Kettesy (1948) cite Sie-Boen-Lian without any mention of David. It is my hope to defend the rights of the real author, now deceased, and to save his name from oblivion.

David's operation, as it should be called, combines effectiveness with good cosmetic appearance. It was my effort to ascertain its true author that first encouraged me to try it, and, leaving my own method which I had found satisfactory up to that time, I soon adopted David's operation and introduced certain variations which appear to be real improvements worth retaining.

Method

The following is a description of the form of David's operation which has proved to be the best. In accordance with David and

* Received for publication November 24, 1949.

all the other authors cited, it is here assumed that an upper lid is to be operated on, but in opposition to them I claim that it is also applicable *mutatis mutandis* to the lower lid, with which I have had equally good results.

(1) The field of operation is disinfected, and the conjunctiva anaesthetized by instillation of procaine.

(2) Novocaine (4 per cent.) adrenaline solution is injected with the lid everted over Brana's or Greenholm's everter. Without piercing the tarsus, the needle

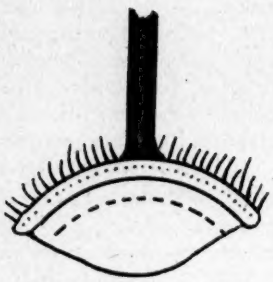

FIG. 1.—Line of incision marked on the everted lid.

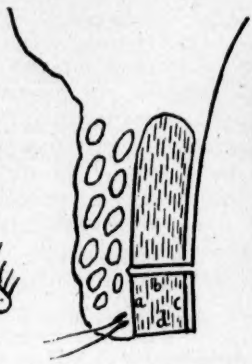

FIG. 2. — Schematic longitudinal section through the upper lid in its natural position with dissected tarsus.

FIG. 3.—Schematic longitudinal section through the everted upper lid. The distal part of the tarsus is held by the forceps and pulled away from the muscular layer after being cut right down to the roots of the lashes. The shading marks the vertical direction of the two parts of the tarsus.

is inserted over the convex edge into the slack tissue in front of the tarsus to infiltrate the orbicular muscle.

(3) Over the everted lid, the incision is made parallel to the margin, along its entire length and through the whole thickness of the tarsus. Thus a strip as wide as the intermarginal surface is separated from the remainder of the tarsus (Figs 1 and 2). Unless the entropion happens to be confined to the middle part of the lid, the everter is pushed into each corner of the lid and the incision is continued into each extremity of the tarsus. After returning the everter to the assistant, the surgeon seizes the distal strip of the tarsus with a forceps and, tilting that structure towards himself, stretches its connections with the orbicularis muscle and disconnects them by scratching with the point of the scalpel until the roots of the cilia are seen (Fig. 3). In contrast with the freeing of the anterior surface of the *distal* part of the tarsus from its connections with the orbicularis muscle, no analogous procedure takes place for the anterior surface of the *proximal* part of the tarsus. This is my first deviation from the original method of David, and here I am in accordance with Mirić. This omission is designed to avoid unnecessary injury.

The separated distal part of the tarsus has an almost square cross-section. Since such designations as "anterior" and "posterior", "superior" and "inferior" become ambiguous when the lid is everted, I propose to use the following unequivocal expressions (see Figs 2, 3, 4, 5, and 7).

"*a*", anterior surface freed from its connections with the muscular tissue
"*b*", sectional surface originally situated above
"*c*", posterior surface covered with conjunctiva
"*d*", intermarginal surface originally situated below.

(4) Three double-armed No. 1 sutures in two different colours, such as one black and two white, are used. The middle of the proximal part of the tarsus is seized with the forceps and stretched forward (Fig. 4). The two needles of the black suture are introduced, about 4 mm. apart, into the anterior surface of the tarsus through the soft muscular tissue in a vertical direction following the Meibomian ducts, and are made to emerge in the sectional area with the cross-sections of the ducts (Fig. 5). Similarly, both pairs of needles with white sutures are inserted, one into the nasal third and the other into the temporal third of the tarsus, so that all six ends of the sutures emerge at approximately equal distances (Fig. 6). Both ends of each suture are pulled out

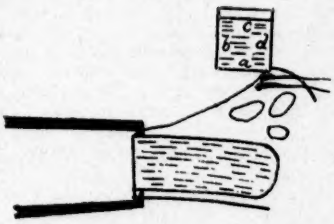

FIG. 4.—Proximal part of the tarsus seized by the forceps and pulled forwards.

FIG. 5.—Suture sewn through both parts of the tarsus, a schematic longitudinal section.

together, so that they project from the sectional area in equal lengths. Now the six needles are inserted one after the other at equal distances into the distal part of the tarsus, the first and the last being situated at either extremity of the section. The needles are inserted into surface "*a*" and emerge from surface "*c*" (Fig. 6). Finally, the two ends of each suture are pulled out together, the new lid-border being held in place by the closed forceps. Thus the contact of the surfaces is strengthened and any haemorrhage which may occur after relaxation of the pressure exercised by the everter is checked.

The introduction of the needles from the anterior surface of the tarsus is my second innovation, in contrast with the authors cited who insert them from behind. The advantage is that the three loops, being buried in the tissue, will not rub the cornea.

The effect of the suture is to turn the distal part of the tarsus forwards through 90° (Fig. 7):

(i) *a*, originally the anterior surface, is turned upwards to join by healing with the sectional area of the proximal part;
(ii) *b*, the sectional surface, becomes the posterior surface;
(iii) *c*, the posterior surface with conjunctiva, becomes the marginal surface;
(iv) *d*, the margin, is substituted for *a* in the plane of the outer surface of the lid.

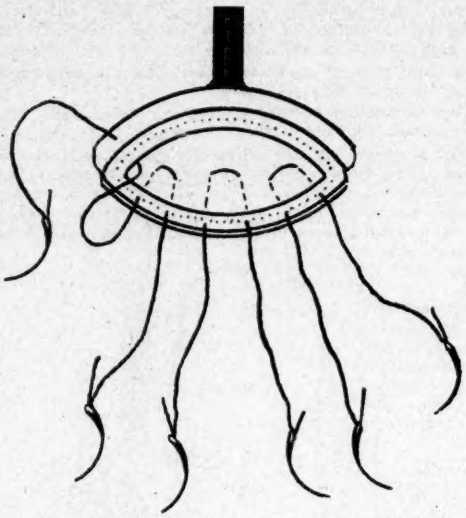

FIG. 6.—Position of sutures within the everted upper lid. The sectional surfaces of both parts of the tarsus are recognizable by the points marking the cross-sections of the Meibomian ducts. All the threads are embedded in the proximal part of the tarsus. The first needle on the right has already pierced the distal part, entering surface *a* (original anterior surface, here invisible) and emerging from surface *c* (original posterior surface covered with conjunctiva, here visible).

FIG. 7.—Final effect of sutures shown in a longitudinal section of the upper lid in its natural position (compare Fig. 2).

Thus the lashes, if previously directed downwards, are now directed forwards. The surfaces "*a*", "*b*", "*c*", and "*d*" being almost equal in breadth, no deformation of the margin or of the lid will result. On the contrary, the previous boat-shaped crookedness of the eye-lid will be straightened.

According to David and Sie-Boen-Lian the sutures are now knotted; Mirić uses small beads for this purpose, but Kettesy rejects them. My third modification is to avoid knotting the sutures at all. Their friction in the stitch canals provides sufficient security, and knotting is redundant. Tightly drawn sutures are apt to cause unevenness in the new lid-margin, and post-operative swelling of the lid may cause the stitches to cut into the flesh, whereas with unknotted sutures the stitch canals simply slide along to conform with the swelling, and the set of the lid remains undisturbed. When the swelling subsides the distal part of the tarsus is again pushed back with the closed forceps to consolidate the effect of the suture. The unknotted sutures are shortened to equal lengths, about 5 cm., and left hanging.

(5) My fourth modification is a new method of dressing. Over both lids of each eye (assuming that the two upper lids have been operated on) is laid a sterile patch of gauze, and the two patches are fixed by one long, narrow, plaster strip, stretching from temple to temple over the bridge of the nose. The lower halves of the patches are folded upwards so that only the upper lids remain covered,

and each set of six ends of thread is turned up over its own patch. A closely twisted gauze roll (about 0·5 to 1 cm. thick) is placed upon the patch on each upper lid just over the incision. A slight pressure on this gauze roll further everts the lid border through almost another 90°, thus increasing the effect of the suture to almost 180°. The lashes which have been pointing forwards are now made to turn upwards, against the outer skin of the lid. This pressure is exerted continuously by a bandage, which is stretched from the right temple over the bridge of the nose to the left temple and fixed thus:

First Turn: from the occiput, over the right auricle, to the right external canthus, over the left eyebrow, and back to the occiput;

Second Turn: over the right eyebrow to the left external canthus, over the left auricle, and back to the occiput;

Third Turn: over the right auricle across the bridge of the nose, over the left auricle, and back to the occiput (this last turn describes a slightly downward convex curve).

Each turn has the effect of lifting one half of one lid and fixing it in the everted position as by a sling. The first turn lifts the outer half of the right upper lid, the second turn the outer half of the left upper lid, and the third turn the inner halves of both upper lids. If only the right upper lid has been operated on, the second turn is omitted; ***vice versa***, if only the left upper lid has been operated on, the first turn is omitted. The lashes, now directed upwards, are held in position by this bandage. The suture-ends must, of course, be relaxed after completion of the dressing, so that they do not exert any pressure on the lid border. To apply this dressing to the lower lids the bandage is passed under the auricles instead of over them.

The dressing covers the upper lids but allows the palpebral fissures to be opened so that the patient may see his way about. After five days the threads are removed by cutting one end of each pair and drawing out the other end. The bandage is then put on for one more day without the sutures. Immediately after the bandage is finally removed an ectropion of the lid margin appears, with the lashes directed upwards close to the skin, but the normal position is soon restored.

All the cited authors agree that the advantages of David's operation are its efficacy, permanence, and admirable cosmetic effect, since the skin remains intact, and no disfigurement can result from turning the distal strip, the dimensions of which are unchanged.

It is a further proof of the value of this operation that yet another independent but very similar description has recently been published by Torgersruud (1950).* This author, writing from Ethiopia, recognized the possibility that some similar method had already been published, and anticipated criticism by drawing attention to his lack of access to medical literature. I must claim a similar indulgence in respect of the probable incompleteness of my references. Torgersruud's method is in fact identical with David's, except in the use of double sutures. The effect which he obtains by the additional sutures is brought about in a bloodless manner by my fourth modification, my peculiar method of bandaging, described in step (5).

* EDITOR'S NOTE. Though it appeared first in this *Journal*, Dr. Torgersruud's article was not in fact received for publication until some time later than Dr. Raubitschek's.

Summary

The real inventor of the so-called Sie-Boen-Lian operation for entropion was Dr. J. David. His operation is described and the following improvements are proposed by the present author:

(1) to avoid severing the connections of the proximal part of the tarsus with the orbicular muscle;

(2) to insert the threads from the anterior surface of the tarsus and bury the loops in the tissue

(3) to avoid knotting the threads;

(4) to bandage the eyes in such a way as to evert the lids still further during the healing process.

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INFLUENCE OF ALCOHOL ON FUSION*

BY

LORD CHARNWOOD

THE fact that the consumption of a sufficient quantity of alcohol will cause diplopia, even in subjects who normally show no heterophoria, is well known. Until recently, the author, in common with many others, thought that this was due to a toxic exotropia, such as is seen in the early stages of anaesthesia.

Powell (1938) and Colson (1940) have shown that the effect of alcohol on lateral heterophorias is to cause a reduction of exophoria, or an increase of esophoria, but that, in either case, the average change only amounted to about two prism dioptres. These findings have been confirmed by the author; he did not, however, find that alcohol had any effect on vertical heterophorias. The only record that he knows of alcohol influencing vertical heterophorias is a paper by Connolly (1946), whose results seem somewhat inconsistent and difficult to interpret; furthermore the author has not succeeded in confirming them.

It is well known that alcohol makes inhibition more difficult, and Bárány and Halldén (1947) have shown that this applies to the two retinal images. This explains why the subject is conscious of the diplopia, but does not explain why it occurs. In view of the small change in heterophoria produced by alcohol, it seemed likely that the cause of alcoholic diplopia was a reduction in the subject's power to overcome any heterophoria present.

Method

In order to test this assumption, the subject's power to overcome vertical prisms was recorded before and after drinking measured quantities of alcohol. The fixation target was a black horizontal line, 2 mm. wide and 7·5 cm. long, on a white ground illuminated at a level of about 50 foot-candles, seen at a distance of seven metres. The prism power, base up and base down before the right eye, required to produce diplopia was recorded at regular intervals.

Unfortunately only four subjects were available. Two of these were emmetropic and the other two wore their corrections which gave them an acuity of 6/6 or better; none of the four showed any vertical heterophoria at the start or any appreciable horizontal heterophoria. One subject (the author) shows about one prism dioptre of right hyperphoria as a result of prolonged occlusion tests on his two eyes, and the present results suggest that one other subject would also show a small degree of right hyperphoria. All four subjects are completely free from ocular discomfort.

* Received for publication October 17, 1950.

The alcohol used was a well-known commercial brand of gin containing approximately 30 per cent. ethyl alcohol. Each dose consisted of one fluid ounce of gin (about 7 g. ethyl alcohol), flavoured and diluted to taste. Each subject took five doses (about 35 g. ethyl alcohol). The subjects were allowed a small amount of food, such as would normally be consumed with such a dosage of alcohol at a cocktail party.

As soon as each subject's initial fusional reserves had been recorded he took his first dose of alcohol. At the end of a quarter of an hour his fusional reserves were again recorded and he took a second dose; subsequent doses were taken in the same way and the final measurements recorded a quarter of an hour after drinking the fifth dose.

Vertical fusional reserves were measured in preference to horizontal for the following reasons: they are not complicated by accommodation and convergence, they are smaller, there is little or no evidence that alcohol, in such doses as the author used, has any effect on vertical heterophorias. Measurements were made with a Risley rotary prism, giving a maximum power of six prism dioptres. It was always placed before the right eye and the prism power was increased slowly first base up and then base down. The subject had no knowledge of the reading obtained.

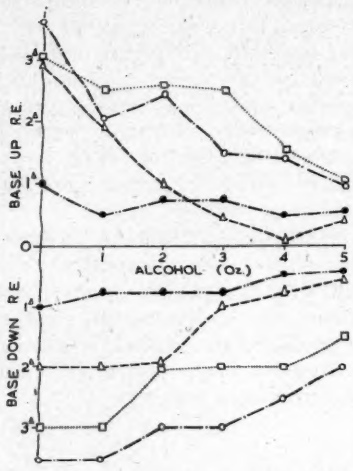

FIG. 1.—Individual readings for each subject.

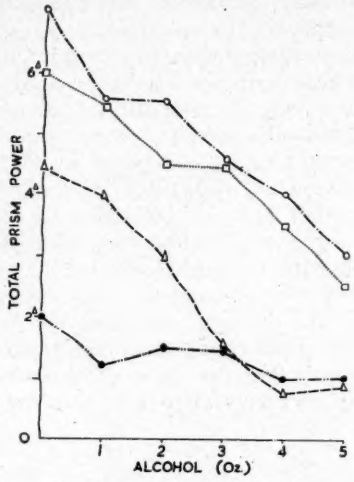

FIG. 2.—Total vertical reserves for each subject.

Results

As one would expect, there was a considerable variation in the initial readings on the four subjects and the individual readings for each subject do not fall on straight lines or smooth curves. The total fusional reserves of each subject, obtained by adding together the base up and base down readings, form much smoother lines, and the results of averaging the readings of even so few as four subjects produce surprisingly smooth curves, both for prism base up and base down separately and for the total fusional reserves.

Fig. 1 shows the whole of the data collected for each subject. Fig. 2 shows the total fusional reserves for each subject at each recording. Fig. 3 shows the result of averaging the readings on the four subjects, prism base up and base down being shown as well as average total vertical fusional reserves.

Discussion

It is obvious from Fig. 3 that alcohol reduces the subject's power of overcoming vertical prisms, and that, initially, this reduction is in almost direct proportion to the amount of alcohol consumed. The curve of total averages does suggest the flattening out that one would expect, but it also suggests that this flattening out does not occur until the subject's reserves are very seriously impaired.

Figs 1 and 2 show that the reduction of a subject's fusional reserves by alcohol is approximately proportional to their initial value, since the curves in Fig. 2 are not parallel to each other but tend to cut the horizontal axis in approximately the same place. The slight asymmetry between the prism base up and prism base down curves in Fig. 3 is probably due to the right hyperphoria that the author shows under occlusion and the possible right hyperphoria in one other subject already mentioned.

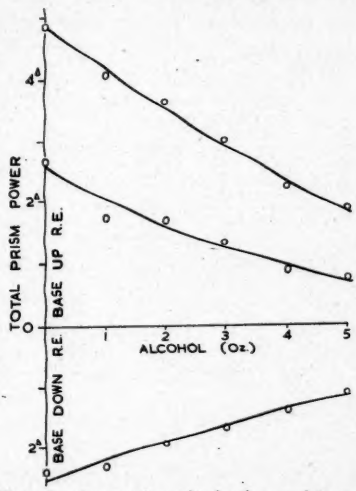

FIG. 3.—Average results for four subjects.

The irregularities of the individual curves in Fig. 1 could be due to random changes in vertical heterophoria similar to, though smaller than, those recorded by Connolly, but they are more probably due to the difficulty of measurement inherent in an experiment such as this.

It is generally stated that the eyes diverge during the earlier stages of anaesthesia but return to approximate parallelism when full surgical anaesthesia is reached. This conclusion must be based on comparatively gross objective observations made during the routine of operations. It seems to suggest that the third

nerve nucleus is affected by general anaesthetics before that of the sixth nerve. It is very possible that if an adequate degree of anaesthesia could be obtained with alcohol a similar result might be observed, but the author does not consider this relevant to the present investigation, which is only concerned with sub-clinical degrees of intoxication.

Conclusions

Alcoholic diplopia is the result of two factors: a reduction in the subject's power of overcoming any heterophoria that may be present, and an increase in the difficulty of suppressing the diplopic image.

The frequency with which such complaints as whooping cough and measles appear to be the immediate precipitating cause of squint in hypermetropic children may be due to the production of some specific toxin with an action comparable to that of alcohol.

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CONCENTRATION OF GLUCOSE AND TOTAL CHLORIDE IN TEARS*

BY

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ALTHOUGH numerous studies of the chemical composition of tears have been made, some points still remain obscure or contradictory. In this paper we confine ourselves to a consideration of the concentration of glucose and chloride at progressive stages of lacrimation, in subjects with a normal glucose metabolism.

In Table I values of the concentration of glucose found by the more recent workers are shown. It is apparent that a great diversity of opinion still exists, since the values range from a maximum of 65 mg. per 100 ml. to a complete absence of glucose.

TABLE I

Sugar Content of Tears

Investigator	Date	Method	Average Sugar (mg. per 100 ml.)
Wada	1922	Unknown	Present in some subjects
Ridley and Brown	1930	Maclean	65
Borsellino	1935	Bang II	27
Michail, Vancea, and Zolog	1938	Hagedorn-Jensen	Absent
Giardini	1949	Hagedorn-Jensen	10.2

It should also be noticed that reducing value does not necessarily indicate sugar content; thus one of us (Giardini, 1948) found a reducing value of 10·2 mg. per 100 ml. but failed to observe crystals of phenylglucosazone which, in biological fluids, will identify glucose in a concentration of approximately 5 mg. per 100 ml. (Rossi, 1933). In the present work reducing values have been estimated before and after fermentation with yeast.

The values of the chloride concentration found by other workers

* Received for publication October 25, 1950.

are shown in Table II, where the figures are given as mg. NaCl per 100 ml. In addition, the equivalent values in millimoles per kg. H_2O are shown.

TABLE II

Chloride Content of Tears

Investigator	Date	NaCl (mg. per 100 ml.)	NaCl as Chloride (mM. per kg. H_2O)
Frerichs	1846	500	87.5
Magaard	1882	400	70.0
Arlt	1885	1,300	218.0
Ridley and Brown	1930	658	115 4
Michail	1938	823	142.4
Smolens and others	1949	490	85.05

Since it is possible that chloride concentration may vary with intensity of lacrimation, the chloride content has been determined by us in tears collected at definite stages of secretion.

Methods

Collection Procedure.—Lacrimation was induced by tear gas, tears being collected from each eye with a 12 in. Pyrex tube of 4 mm. internal diameter drawn to a 4 in. capillary of 1 mm. internal diameter at the tip. The annealed tip was placed in the conjunctival sac near the outer canthus, and the collected tears transferred to a corked Wassermann tube graduated at 0·2 ml.*

For the glucose determinations blood samples were necessary as the subjects were not under basal conditions. Our determinations of the sugar content were made by the Hagedorn-Jensen method combined with a fermentation process whereby the glucose is estimated by difference. For the preparation of the 10 per cent. yeast solution 10 gm. fresh baker's yeast were shaken with a large excess of distilled water, centrifuged at 3,000 r.p.m., and the supernate completely removed; this was repeated five times. The final yeast precipitate was made up to 1 l. with distilled water at 0°C. and a 10 ml. aliquot run into a test-tube placed in ice-water until ready for use. Vigorous yeast activity of the stock solution is maintained for about a week if the suspension is refrigerated, but before further use the stock solution must again be washed repeatedly. Blood and tear samples for fermentation were introduced into 10 ml. ground glass stoppered test-tubes; to each blood tube was added one drop (0·04 ml.) heparin solution containing 40 International Units per ml. aqua dist. Of the tears for fermentation, 0·2 or 0·1 ml., depending on the lacrimation stage under investigation, were placed in a stoppered test-tube, and the protein of the corresponding unfermented tears precipitated. To all fermentation tubes was added 0·2 of the freshly washed and chilled 10 per cent. yeast solution. The fermentation tubes were placed in a water bath and incubated for half an hour at 36 to 38°C. with occasional gentle shaking. On cooling, the protein was precipitated by the Somogyi (1930) technique, and the solution boiled for 4 min. and allowed to stand for 8 hours. All the solutions were centrifuged for 10 min. at 3,000 r.p.m., and the supernate run into prepared tubes containing the Hagedorn-Jensen reagent. The precipitate was washed twice with 3 ml. aqua dist., and again centrifuged to ensure that no yeast passed into the reaction tubes. Reagent

* We are indebted to Mr. F. T. Ridley, F.R.C.S., for his advice regarding the procedure for the collection of tears.

blanks, and yeast-water blanks, were run alongside a standard solution containing 20 mg. per cent. glucose. A fermented standard glucose was included to check the activity of the yeast.

Determination of Total Chloride.—In order to detect any dilution effects, we made our determinations at widely separated lacrimating stages; thus a relationship might be established between the varied results of previous workers.

The total chloride was determined by the Sendroy technique (1936). Our subjects were divided into four groups according to the lacrimating stages involved. In the first three lacrimation was induced, and tears collected, as described above.

Group I. 0·22 ml. taken from the first lacrimation of each eye from three subjects, followed by a further 0·22 ml. Right and left samples at each lacrimating stage bulked. Six analyses made.

Group II. 0·22 ml. taken from the first lacrimation of three subjects and bulked for analysis.

Group III. 0·11 ml. taken from each eye of six subjects. Right and left samples bulked. Six independent analyses made.

Group IV. Two analyses made on the bulked tears of two groups of ten subjects, each contributing approximately 0·01 ml. from each eye. Collection was made by pipette, the tip of which when moved slightly in the conjunctival sac, induced the minute quantity of tears required for analysis. In order to reduce the loss by evaporation which must occur to some extent in Groups I, II, and III, the small traces of tears in Group IV were run directly into the weighed quantity of 0·085 M. phosphoric acid required by the Sendroy method, and their weights obtained by difference.

Determination of Total Solids.—The total solids were determined by evaporating to dryness at 105°C. tears weighing 0·6028 gr. The solid residue was cooled in a dessicator and weighed immediately after removal; this weighed 0·0110 gr. The total solid was therefore 1·84 per cent.

Results

Glucose.—The results from twelve subjects are shown in Table III (overleaf). From the first seven subjects 0·22 ml. tears was taken from both right and left eyes, and when possible a further 0·22 ml. In the last five subjects only 0·1 ml. was collected from each eye, both being combined for analysis.

In 25 determinations the Hagedorn-Jensen analysis for total reducing substances gave a range of values equivalent to 2·8 to 7·7 mg. per 100 ml. of glucose, with an average of 6·06 mg. per 100 ml. Agreement between the two eyes in the same subject was always within 0·8 mg. per 100 ml. with no significant predominance of either eye. At different lacrimating stages, a decrease of concentration, varying from 2·6 to 0·2 mg. per 100 ml., was found in successive samples in four cases, and an increase ranging from 0·4 to 1·28 mg. per 100 ml. in three cases. With such variability and minute changes in concentration between the first and second samples, no generalization may be made concerning the possibility of the dilution of glucose in tears during a continuous lacrimation.

The true glucose determined by the fermentation method varied between 1·0 and 5·0 mg. per 100 ml., with an average of 2·6 mg. per 100 ml.; in one case and in one eye only, there appeared to

TABLE III

Sugar Content of Blood and Tears

TRS—Concentration of total reducing substances.
NGS—Non-glucidic substances.
TGS—True glucose.

Subject	Blood			Eye	Tears		
	TRS	NGS	TG		TRS	NGS	TG
1	117	22	95	R1	2.8	1.2	1.6
2	171	28	142	R1 L1	3.8 3.6	3.8 2.4	0 1.2
3	137	30	107	R1 R2 L1	7.4 4.8 7.4	2.4 3.4 2.4	5 1.4 5
4	153	18	125	R1 R2 L1 L2	6.15 5.70 5.37 5.04	2.72 2.55 1.62 2.87	3.43 3.15 4.75 2.17
5	106	28	78	R1 R2 L1	6.40 7.36 7.16	2.8 4.8 3.51	3.6 2.56 3.65
6	102	18	84	R1 R2 L1 L2	6.23 6.63 5.52 6.80	2.72 3.77 3.77 4.4	3.51 2.86 1.75 2.4
7	187	12	175	R1 R2 L1	6.46 5.83 6 31	4.07 3 6 3.85	2.39 2.23 2.46
8	112.5	24.7	77.8	R+L	5.4	4.8	1.6
9	120	22.5	97.5	R+L	7.7	5.6	2.1
10	—	—	—	R+L	7.3	5.06	2.3
11	111.6	26.5	84.1	R+L	6.02	4.6	1.42
12	124	20	104	R+L	6.9	4.9	2

R1 ... Concentration in 1st lot of tears from right eye.
R2 ... Concentration in 2nd lot of tears from right eye.
L1 ... Concentration in 1st lot of tears from left eye.
L2 ... Concentration in 2nd lot of tears from left eye.
} concentration in mg. equivalent glucose per 100ml.

be a complete absence of glucose. The true glucose of tears represented an average of 41·0 per cent. of the total reducing substances, while the true glucose of the same subject's blood was 81 per cent.

TABLE IV

Chloride Concentration in Tears

Group	Chloride (NaCl in mg. per 100 ml.)	Chloride (mM. per Kg. H_2O)	Volume Tears taken (ml.)	Number of Subjects
I	A. 628	110.2	0.22	3
	B. 603	105.8	0.22	—
	A. 635	111.4	0.22	—
	B. 600	105.0	0.22	—
	A. 732.5	128.2	0.22	—
	B. 688	120.5	0.22	—
II	665	116.5	0.22	3 (bulked)
III	698	122.4	0.11	6
	715	125 0	—	—
	680	119 3	—	—
	689	120.8	—	—
	726	127.0	—	—
	689	120.8	—	—
IV	770	135.0	0.01	10 (bulked)
	776	136.0	0.01	10 (bulked)

Group I lacrimation profuse: A, first withdrawal. B, second withdrawal.
Group II lacrimation also profuse
Group III lacrimation less profuse
Group IV only 0.01 ml. could be taken, no tear gas used

Average chloride Gp. I. B ... ... 630 (110.4 mM.)
Average chloride Gp. I A and Gp. II ... ... 665 (116.8 mM.)
Average chloride Gp. III ... ... 697 (122.4 mM.)
Average chloride Gp. IV ... ... 773 (135.5 mM.)
} see Figure (overleaf).

Chloride.—As shown in Table IV, the second 0·22-ml. samples, after profuse lacrimation, had an average chloride concentration of 110·4 mM. per kg. H_2O (Group I.B), while the average values taken after progressively earlier lacrimating periods showed a continuous increase, *i.e.*, 116·8, 122·4 and 135·5 mM. chloride after 0·2 ml., 0·1 ml., and 0·01 ml. respectively. The dilution between the first (approx. 0·01 ml.) and the last (0·4 ml.) lacrimal secretion was 18·5 per cent. The Figure illustrates this progressive dilution.

Discussion

As demonstrated, the total reducing substance of tears is extremely low compared with that of blood. In tears true glucose is represented to the extent of only 40 per cent., while in the blood, as is well known, the true glucose represents 80 per cent. The deficiency of this important metabolite may be one reason why tears are a poor culture medium for pathogenic organisms.

The concentration of chloride may have some bearing on problems still under discussion, especially those regarding corneal physiology. From this point of view, the significant concentration in tears is that obtaining at the earliest stage of lacrimation, a value that presumably approximates to that of the normal film in contact with the corneal epithelium. The average value found

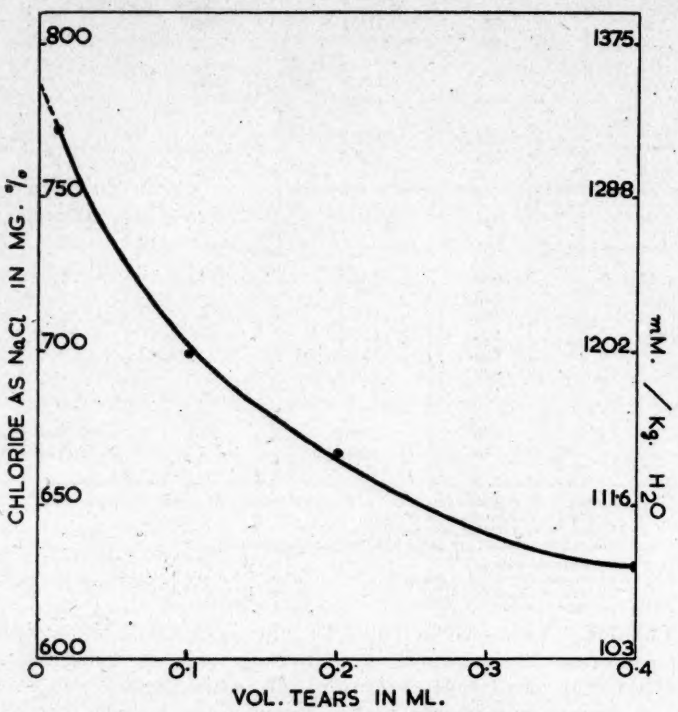

FIGURE.—Chloride dilution with continuous lacrimation.
The average total chloride as NaCl of each stage is plotted against its respective volume. Ordinates, chloride in mg. per 100 ml., and mM. per kg. H_2O. Abcissae, total volume of tears withdrawn.

was 135·5 mM. per l. so that the cornea is apparently in contact with two hypertonic liquids (aqueous humour 124.3 mM. per l., Hodgson, 1937), compared with plasma (105·1 mM. per l., Hodgson, 1937). This finding could provide experimental evidence on the theories connected with the deturgescent state of the cornea (Kinsey and Cogan, 1942; Davson, 1949); however, the concentration of chloride taken alone is not a good index to the tonicity of the solution, since the bicarbonate ion represents a significant and possibly a highly variable fraction of the anions.

In a later paper we propose to discuss the concentration of sodium in tears, since this ion should be a better index to tonicity.

We may note in conclusion that the values found by previous workers (Magaard, 1882; Frerichs, 1846; Ridley and Brown, 1930; Smolens and others, 1949) are lower than ours, with the exception of that found by Michail (1938).

Summary

The true glucose was determined in tears of subjects with a normal glucose metabolism by the Hagedorn-Jensen method combined with a fermentation process. The average total reducing substance was equivalent to 6·06 mg. per 100 ml. glucose, while true glucose was present to the extent of 2·5 mg. per 100 ml. In contrast to the blood, the true glucose of tears represents only 41 per cent. of the total reducing substance. After continuous lacrimation the values were so small and variable that no generalization concerning the probability of a dilution of the sugar content was possible.

Analysis for the chloride was made by the Sendroy technique. After a profuse lacrimation 110·4 mM. per l. chloride were found, while the nearest to normal lacrimal secretion obtainable (first 0·01 ml. of tears to appear) gave a value of 135·5 mM. per l.

The dry weight of tears was 1·84 per cent.

We are indebted to Dr. Hugh Davson for his interest and advice in this work, to men and women of the London Metropolitan Police Force (E. Div.) for their co-operation in contributing tears and blood, and to members of the Staff of the Institute of Ophthalmology and the Ophthalmological Research Unit for their ready and cheerful assistance.

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COLOUR-BLINDNESS AMONG THE CHINESE*

BY

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THE figures quoted in the literature on the frequency of colour-blindness among the Chinese race are based on the investigations of Chang (1932) and of Kilborn and Beh (1934). Chang investigated 2,296 children in primary schools and high schools; his paper, which is written in Chinese, contains the data set out in Table I.

TABLE I

Percentage Colour-Blind (after Chang)

Sex	Number examined	Number of colour-blind	Percentage
Male	1,164	80	6.9
Female	1,132	19	1.7
Total	2,296	99	4.3

Kilborn and Beh's work is better known to the world, because it is written in English. These authors investigated 1,115 male university students, and found 67 (6·3 per cent.) either completely or incompletely red/green-blind. They concluded their report by combining their figures with those of Chang, and thus gave a colour-blindness incidence of 6·5 per cent. for Chinese males and 1·7 per cent. for Chinese females. The red-blind and the green-blind were apparently grouped together under the category of incompletely red/green-blind, both by Chang and by Kilborn and Beh.

We now wish to call attention to a fuller series of statistics worked out by Fang and Liu (1942), who examined 10,334 individuals (7,333 male and 3,001 female). The examinees consisted of school children, university students, soldiers, and technicians. A total of 454 persons, 409 males (5·59 per cent.) and 45 females

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(1·50 per cent.), was found to be colour-blind. Of these, 227 individuals (50 per cent.) were discovered to have " complete " colour-blindness, and the other half " incomplete " colour-blindness. Under the heading " complete " colour-blindness, the anomalous were separated into the completely red-blind and the completely green-blind, whereas under the heading " incomplete " colour-blindness, they were subdivided into the red-blind, the green-blind, and the red/green-blind.

Recently we had the opportunity of examining 11,061 persons, consisting of unselected men, women, and children from all walks of life. The Ishihara pseudo-isochromatic plates, sixth edition, were used. Whenever there was a doubtful case, the American Optical Company's pseudo-isochromatic plates (1944) were also presented for verification. Our tests were conducted under natural daylight illumination according to Ishihara's instructions. Our findings are summarized in Table II.

TABLE II

Incidence of Colour-Blindness in 11,061 Chinese

Sex	Number examined	Incompletely colour-blind	Red/green-blind	Red-blind	Green-blind	Total colour-blind
Male ...	7,542	3	316	15	41	375
Female ...	3,519	—	21	2	2	25
Total ...	11,061	3	337	17	43	400

From the above figures, we estimate that the incidence of colour-blindness in the Chinese is 4·97 per cent. for males, and 0·71 per cent. for females.

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CASE NOTES

ACUTE EYE LESIONS TREATED BY LAMELLAR CORNEAL GRAFTING*

BY

LOUIS PAUFIQUE AND SEYMOUR PHILPS

IT has now been abundantly demonstrated* that, just as skin can be split and grafted, so also can layers of cornea be transferred from one eye to another and be made to grow. Moreover, if this procedure is carried out with due care, the graft will retain its transparency. Thus the optical indications for this course will need no emphasis; the reason for reporting the two ensuing cases is to emphasize that sometimes an optical and therapeutic action may be combined and that lamellar grafting is clearly

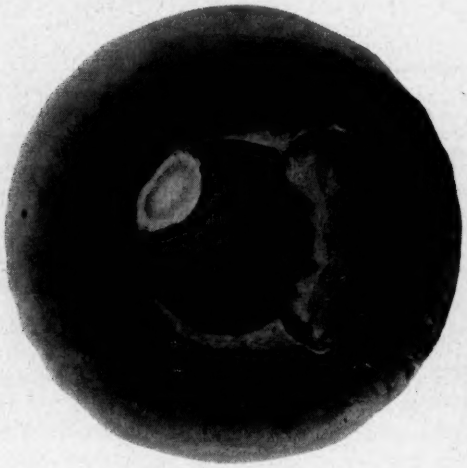

FIG. 1.—Case 1, right eye, February, 1950.

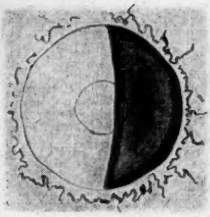

FIG. 2.—Case 1, area of corneal tissue removed.

indicated in several acute eye diseases. We think it no exaggeration to suggest that lamellar grafting saved the sight of the first patient and achieved a shorter convalescence and better optical result in the second than would have been possible by other means.

Case 1.—Mme. B., aged 45, was first seen in February, 1950, with a severe ulcer, involving more than a third of the right cornea. The ulcer was treated

* Received for publication October 23, 1950

energetically with rest, heat, atropine, penicillin injections, etc., but continued to spread so that in a few days it had reached the pupil. A drawing made at that time shows the state of the eye (Fig. 1). It was then decided that, unless something were done, the sight of the eye and possibly the eye itself would be lost; accordingly excision of the ulcer and lamellar grafting of the cornea were carried out by one of us (L. P.) on February 26, 1950.

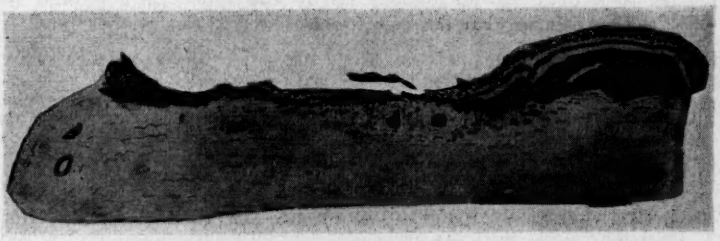

FIG. 3.—Case 1, microscopic appearance of corneal tissue removed.

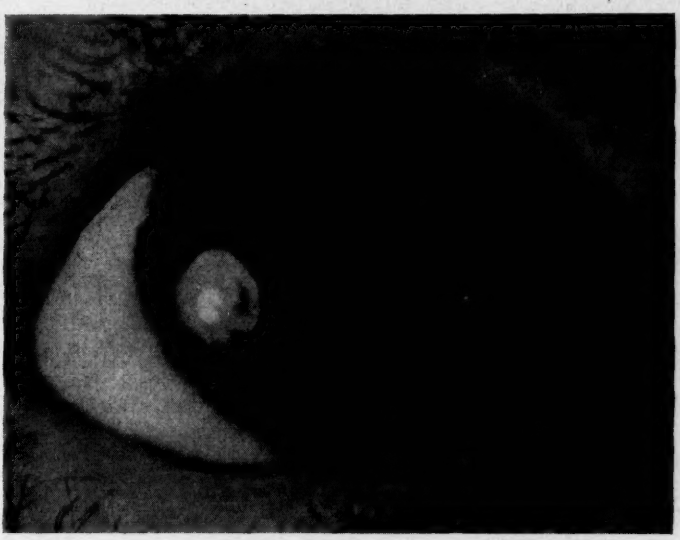

FIG. 4.—Case 1, right eye 4 weeks after operation. The grafted area is demarcated by a grey line crossing the pupil.

Operation.—A vertical incision was made through the corneal tissue from top to bottom of the cornea, and through 4/5 of its thickness, this incision being then extended round the whole nasal limbus until the ulcerated area was enclosed by it (Fig. 2). The layer of cornea complete with ulcer was then dissected off (the microscopic appearance is shown in Fig. 3). The measurements of the excised area were then transferred to a donor eye and an exactly comparable

graft cut and transferred to the host, the graft being retained in position by edge-to-edge sutures. These stitches were removed after four days, and ten days after the operation the eye was healed and quiet. Fig. 4 was taken four weeks after operation—vision 6/9.

Case 2.—J. T., aged 48, a builder, suffered a severe lime-burn of the left cornea in March, 1950. The whole corneal surface was oedematous and stained with fluorescine, while a slough was present in the central corneal area. The cornea did not respond to ordinary measures and a tarsorrhaphy was performed two weeks after the injury, but the eye remained irritable and painful. The tarsorrhaphy was undone and the appearance of the eye 3½ weeks after the accident is shown in Fig. 5, when the tarsorrhaphy had just been undone, the cut area being visible on either lid.

Operation (S.P.).—The ulcerated area could now be enclosed within the circle of a 5·1 mm. trephine, and a disk of tissue penetrating to 4/5 of the corneal thickness was removed. This disk was replaced by a lamellar graft held in position by crossed corneal sutures and protected by a disk of egg membrane. Healing was uneventful; the sutures were removed in four days, and the appearance of the eye two weeks after operation is shown in Fig. 6. Pain and irritability had now gone, and the patient, being self-employed, actually returned to work three weeks after the operation. The final appearance, July, 1950, is shown in Fig. 7—vision 6/12.

FIG. 5.—Case 2, left eye 3 weeks after being burnt by lime. Tarsorrhaphy has just been done.

FIG. 6.—Case 2, left eye 2 weeks after lamellar grafting.

FIG. 7.—Case 2, left eye 3 months after operation.

Lamellar corneal grafting for acute eye disease is not new, but it seems that a wider application of this method would bring relief to some sufferers more quickly than older treatments.

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CYSTS OF UVEAL ORIGIN IN THE VITREOUS*

BY

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CYSTS in the vitreous, originating from the uvea, are very rare; they may be divided into congenital, traumatic, neoplastic, degenerative, and inflammatory. Being usually transparent, they do not impair vision and are often only discovered accidentally in the course of a routine examination.

They are generally unilateral, but Vennin (1910), Litinsky (1931), Perera (1936), and some other authors, have reported bilateral cysts. In the majority of cases, only one cyst can be seen in the same eye. The case to be described is characterized by the presence of two cysts in the same eye, and by signs revealing their possible uveal origin.

Case Report

A. F., a male aged 20, came to our clinic complaining of poor vision since childhood, and was admitted to the hospital on the discovery of a cyst in his left eye. No previous disease or trauma was reported. Except for a concomitant squint of 10° involving the right eye, both eyes appeared normal.

Tension in both eyes was 18 mm. Hg Schiötz.

Retinoscopic examination revealed a myopia of 8·00 D. in the right eye, and 5·00 D. in the left.

Vision 1/50 in the right eye, and 20/50 in the left, could not be improved.

Slit-lamp examination with dilated pupil disclosed small punctate opacities in the equatorial zone of the lens of each eye.

Right Eye.—The slightly liquefied vitreous showed no pigmentation. On ophthalmoscopic examination, a large myopic conus was found extending to the macula, and the slightly depigmented retina presented a tigroid appearance.

Left Eye.—Biomicroscopic examination revealed two regular spherical bodies of 0·5 mm. apparent diameter (one totally transparent and cystic, and the other solid and orange coloured) situated near the posterior pole of the lens (Fig. 1). The two were suspended from two fibrils parallel to each other, and each was connected to a third fibril. They moved with eye movements and returned to their original position when the movement ceased. Two smaller, round, mobile, pigment granules, attached to other thin vitreous fibrils, were located a little above and behind these two bodies.

Although no pigmentation was present in the other eye, numerous smaller and less mobile pigment granules were seen in the inferior quadrant in contact with the posterior surface of the lens. Unlike the fragmentary pigmentation seen in glaucoma, inflammatory, or degenerative conditions, they resembled the flocculi normally observed on the pupillary margin, thus suggesting the possibility that they might similarly have arisen from proliferation of the pigment epithelium. A second cyst, round and translucent, with bright yellowish-orange irregular patches on its surface, was observed at the junction of the anterior 1/3 and the posterior 2/3 of the vitreous. This cyst moved and revolved upon its axis

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FIG. 1.—Slit-lamp appearance of the cyst and the pigmented body situated near the posterior pole of the lens.

with eye movements, and on cessation of these movements, returned to its original position. It had no visible attachment to any part of the eye. No active movements or the presence of scolex or receptaculum capitis indicating a cysticercus, could be observed, either in the small transparent cyst or in the larger pigmented one.

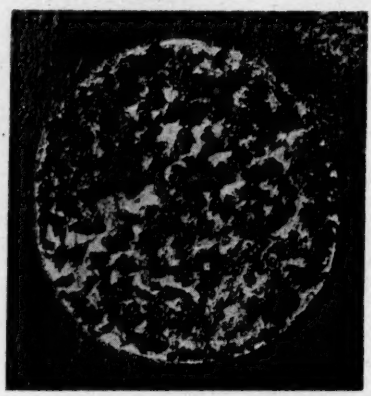

FIG. 2.—Ophthalmoscopic appearance of the large cyst.

On ophthalmoscopic examination, the small cyst was not seen, and the large one appeared like a round cage bespattered with small black patches, casting a shadow on the retina. This cyst was brought into sharpest focus with a +12·00 D. lens with direct ophthalmoscopy, and +2·50 D. lens of the auxiliary slide with the binocular ophthalmoscope (Bausch and Lomb), when a yellowish-orange pigmentation and an iridescence varying according to the light conditions was observed (Fig. 2). The disk was oval, being elongated in the vertical direction. A temporal conus and areas of myopic atrophy were noticed in the retina.

No remnants of the hyaloid artery could be seen on the disk or on the posterior surface of the lens. Transillumination revealed no abnormal shadow in the ciliary region. The patient was observed for 6 months and no change could be determined either in the cysts or in the eye itself.

Routine studies of the blood:

3,600,000 erythrocytes, 4,600 leucocytes, 3 per cent. eosinophils,
Sedimentation rate 4 mm. in one hour,
Wassermann and Mantoux reactions negative,
Weinberg test positive,
Casoni test negative.

The ova of *Ascaris lumbricoides, Trichocephalus,* and *Taenia saginata* were found in the stools.

Cysts in the vitreous, apart from those of parasitic origin, provoke no irritation, and therefore, require no treatment. Since no pathological examinations have been performed on these cysts, their aetiology and nature has not been established with certainty.

Discussion

Our case presents bilateral high myopia, more marked in the uninvolved eye. Cysts in the vitreous, supposedly due to myopic retinal degeneration, have been reported by Vennin (1910), but even in his cases a congenital origin cannot be excluded.

In the case here reported, the presence of abundant pigmentation in the anterior part of the vitreous in association with the cysts in the left eye, and their absence in the right or more myopic eye suggest an aetiology other than myopic degeneration. It is felt that these cysts are probably of congenital origin.

The small cyst and the pigment granules were situated in the retrolental space, and the large cyst occupied the site of Cloquet's canal though it contained no remnants of the canal structures. Nevertheless this position corresponds to the primary vitreous and suggests a developmental anomaly. It is possible that a proliferation of the ciliary epithelium may undergo cystic degeneration and detach itself into the vitreous, during intrauterine or post-natal life. Berliner (1949) claimed that pigmented cysts are not necessarily of uveal origin. But in our case the adjacency of the small cyst and the pigmented spherical body, their similarity, and the presence of numerous pigment granules nearby, suggest that each is probably of uveal origin.

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A CASE OF TOXOPLASMOTIC CHORIORETINITIS CURED WITH ATEPE (ATEBRIN + PLASMOCHIN)*

BY

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FOR the past ten years the diseases caused by toxoplasma have attracted an ever increasing interest, particularly among pediatricians, neurologists, and ophthalmologists. The symptoms caused by the parasite are well known, but it has not yet been possible to find any effective remedy. In this Journal Ridley (1949) gave a perspicuous description of toxoplasmotic chorioretinitis; other useful articles are those of Krause and Smith (1946), Bamatter (1947), and Binkhorst (1948). Regarding therapy, Ridley says:

> There is clearly no prospect of improving a retina already destroyed, but the child may be treated in the active stage of the disease and the mother during or before other pregnancies. So far chemotherapy has proved disappointing. Penicillin is ineffective, but sulphonamides though inactive *in vitro* seem to be effective *in vivo*. One cure has been claimed by the administration of sulphonamides and emetine. It is hoped that other drugs, especially organic preparations of arsenic and antimony, which are effective against other protozöal and Leishmanian infections, may prove successful, since the organism is rather highly differentiated.

The following case is interesting in that it reacted extraordinarily rapidly to atepe (atebrin + plasmochin).

Case Report

The patient, a 23-year-old woman, has always had grossly defective sight in the left eye, which has squinted outwards from birth. Between 1942 and 1945 she had three slight epileptic attacks. She consulted an eye-specialist in November, 1948, and "maculacolobom" and strabismus were noticed in the left eye. Some small pigment spots appeared close to the macula in the right eye; otherwise there was nothing remarkable. At that time her visual acuity was:

Left eye, hand movements
Right eye, 1 ($+0{\cdot}5 \times 90°$)

She consulted the specialist again on January 14, 1949, and then declared that she had recently had a slight "cold" with fever. About a week later she began to see indistinctly with the previously healthy right eye.

Ophthalmological Examination.—Numerous fine opacities of the vitreous body were discovered. Directly under the papilla, at a distance of a good papilla diameter, there was observed active greyish-white chorioretinitis, somewhat larger than a papilla and more massive than is usually to be seen in retinochoroiditis.

* Received for publication June 14, 1950.

The inflammatory focus protruded some dioptres into the vitreous body. Other small foci could be observed in the vicinity. Close to the papilla and the macula there were some small spots of pigment. The papilla and other parts of the eye were normal. The visual acuity of the right eye was 0, 6−0, 7 (+0, 5×90°).

Medical Examination.—The patient's general state of health was good.

Sedimentation rate 6 mm.;
Mantoux test 1 mg. negative;
Meinicke test negative;
Toxoplasmotic neutralization test of blood-serum, positive.

X-Ray Examination.—This gave normal results for the thorax and nasal sinuses, but the following report was made on the cranium:

On the general picture of the cranium there appear some small calcified granules at the hindmost part of the left parietal region, evidently superficial. No other calcifications are identifiable.

To sum up, the findings were:
(1) Congenital "macular coloboma" in one eye.
(2) Temporary epileptiform attacks. Very small calcifications on one side of the cerebral cortex.
(3) Re-activation of a congenital toxoplasmotic infection, with fresh chorioretinitis on the previously healthy right eye, and positive blood-serum toxoplasmotic neutralization test.

Therapy

After the patient had been subjected to the usual treatment for choroiditis for one month—during which certain progress of the disease could be observed—atepe treatment (1 tablet three times daily) was begun on February 12. On February 16 the chorioretinitis had subsided, to be replaced by a choroidal atrophy; traces of oedema were left at the edge of the focus and these disappeared after a few more days. The patient had then had altogether fifteen tablets. Since that time she has remained healthy, and up to the last examination (May 25, 1950) there has been no recurrence.

Summary

A case of chorioretinitis, caused by toxoplasma, was completely cured after five days' treatment with atepe (atebrin + plasmochin).

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HAEMORRHAGE FROM THE LACRIMAL PUNCTUM*

BY

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HAEMORRHAGE from the punctum is exceedingly rare, scant reference is made to it in the literature, but the following cases are on record:

Konikow (1916) recorded a case of severe epistaxis, in which anterior and posterior tampons were inserted. A few minutes later "bloody tears" began to flow from the corresponding eye. Pressure on the nasal duct stopped the flow. Hird (1932) reported a case in a woman aged 39, of blood in the right eye for four days, with a swelling at the site of the right lacrimal sac. The patient stated that she used to get bleeding from the eye as a child, and that she had had a tumour removed five times in childhood, the last time when aged 13. There were some old scars in the lower lid, presumably the sites of the previous operations. A colleague reported the removal of a papillomatous growth from the right lower fornix and the application of electric cautery to some small papillomata on the conjunctival surface of both upper and lower lids. Pressure over the distended lacrimal sac caused a blood-stained discharge to escape from the punctum into the conjunctival sac, and on further pressure pure blood escaped. The following day the sac and contents were excised, and the pathologist confirmed the diagnosis of a simple papilloma of the lacrimal sac. Jongkees (1941) reported bleeding from the lacrimal duct during nasal haemorrhage. Messner (1947) reported his second observation of profuse ocular haemorrhage after tamponage of the nose for epistaxis. Spontaneous epistaxis occurred in a hypertensive woman aged 72, who treated it by packing the nose with cotton wool. Blood issued from the inferior lacrimal punctum of the left side. Tamponage of the nose with stryphon gauze, intravenous calcium injection, and clauden-coagulen injected intramuscularly stopped the haemorrhage. Thirty-six hours later the patient was in good condition. Urbantschitsch (1946) described a somewhat similar case, which occurred after a fracture of the nasal bone. Valière-Vialeix (1947) makes a similar observation.

To these I wish to add the following case. A 78-year-old publican, of ruddy complexion, who had been accustomed to take more than a bottle of whisky a day for many years, had intermittent bleeding from the left eye for seven days, and had suffered an alarming and profuse haemorrhage the previous night.

Blood was seen escaping from the inferior lacrimal punctum and trickling down the cheek. No lesion of the eye or lids was present. There was no swelling over the lacrimal sac nor was there any previous history of epiphora.

Digital pressure over the sac at first increased the flow of blood from the lower punctum but after a few minutes the bleeding stopped and did not recur. Some clotted blood in the left nostril was observed. The patient admitted to slight and negligible epistaxis, but was convinced that he had bled first and very much more profusely from the eye. *X* rays of the area revealed no pathology. The blood pressure was not raised.

* Received for publication October 12, 1950.

Apart from Hird's case, all those reported have been associated with epistaxis, with back pressure from the nasal cavity probably present. Apparently, however, *bleeding from the puncta does not readily occur in pathological conditions of the lacrimal canaliculi or sac.* Carefully detailed reports of mycotic concretions (Ruys, 1935; Elliot, 1941; Brinckerhoff, 1942), papillomata (Juler, 1915; Maxwell, 1929), and granulomata (Nicholls, 1939) of the canaliculi, primary tumours (Penman and Wolff, 1938; Spratt, 1940; Roberts and Wheeler, 1944), cysts (Canitano, 1923; Freiberg, 1927), granulomata (Stallard, 1940), polyps (Chavarria Lopez, 1948), and gumma (Havel, 1948), of the lacrimal sac, foreign bodies within the sac (Costenbader, 1945), and mycotic obstruction of the nasolacrimal duct (Fine and Waring, 1947), make no mention of this complication. Punctal haemorrhage produces such a startling and unmistakable picture that it cannot be missed. Even in the case of traumatic internal rupture of the lacrimal sac, demonstrated by lipiodol injection and *x*-ray examination, reported by Posthumus (1940), no punctal bleeding was noted.

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ABNORMAL INSERTION OF INFERIOR OBLIQUE*

BY

B. D. BANERJEE

A girl aged 18 was admitted to hospital for operative correction of internal squint. The squint was incomitant, the estimated angle being +50 fixing left eye and +40 fixing right eye. No vertical deviation of the eyes was demonstrated.

On exposure of the right external rectus, it was found that the right inferior oblique was in a much more anterior position than normal, and that just behind the insertion of the external rectus the two muscles blended, the inferior oblique fibres being internal and then inserted by a common tendon into the sclera in the position of a normal external rectus.

This was the only insertion of the inferior oblique found. The patient had not been subjected to any previous ocular operation.

Thanks are due to the surgeon, Mr. J. R. Acfield, who performed the operation, and has allowed me to publish this case note.

* Received for publication July 28, 1950.

APPLIANCE

A SNARE TO REDUCE POST-EXCISIONAL HAEMORRHAGE*

BY

JOHN FOSTER

Leeds

PRIMARY orbital haemorrhage after excision of the eye may delay completion of the operation for 5 to 15 minutes, may necessitate a tight bandage, and may recur as secondary haemorrhage in the ward. A haematoma may produce a reaction leading to the loss of an orbital implant.

Amongst the simpler antidotes employed to-day are rotation of the globe by traction on the stumps of the tendons prior to cutting the optic nerve, diathermic section of the nerve, hot irrigation, and pressure by hot packs or ball-shaped haemostats afterwards. Wright (1930) introduced the use of Eves' tonsil snare, subsequently discarding this for curved orbital forceps (which crushed the optic pedicle) which he found more effective. Kirby (1945), agreeing with Wright that snares are liable to open Tenon's capsule, prefers to use hot packs only. Myers (1950), advocating the use of snares, claims that they are less liable to open Tenon's capsule than curved scissors. My own experience with orbital clamps, hot packs, and irrigation has been discouraging.

Various tonsil snares devised since 1938 (including the original Eves' snare kindly given me by Wright) have proved unreliable, as one of the following difficulties often occurs:

(1) the wire breaks,

(2) the wire becomes detached at one end from the loop in the handle,

(3) the optic nerve either cannot be cut without the exertion of force, which hurts the operator's hand, or it cannot be cut at all.

The small and extremely simple snare (made to my design by Down Bros.) shown in the Figure (overleaf) has none of these faults and has proved effective so far in every case in which it has been used in the last few months. Although this snare will cut the "obliques" and the nerve together, it is better to cut

* Received for publication August 21, 1950.

these muscles with scissors in any case where the eye has been perforated or incised, as the increased pressure exerted bursts the eye. A long section of optic nerve can be obtained by pushing the snare as far back as possible and simultaneously levering the eye forward with the spoon-like spatula of Trelat (or Weltz). Although the wire (stainless steel SWG26) can be used several times, it may become kinked and is best replaced after each operation.

FIGURE.—Excision snare half scale. The wire loop is tightened by rotating the butterfly thumb-screw, pressure being maintained by the ratchet.

Some users of this snare have constricted the optic nerve with it and have then used scissors to divide the nerve between the constriction and the globe. It must be emphasized that the snare should be tightened rapidly until resistance is felt, and then slowly until the nerve is divided completely.

As other advocates of snares for excision have indicated, post-excisional haemorrhage is negligible after successful use of the instrument, the implant can be inserted without delay, tight bandaging is unnecessary, and convalescence is greatly shortened.

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BOOK NOTICE

Vernal Conjunctivitis. By M. N. BEIGELMAN. Pp. 430 + xvii. Four colour plates, 49 half-tone illustrations, extensive bibliography. University of California Press, Los Angeles. 1950. $6.

The busy practising ophthalmologist when presented with a volume such as this, weighing rather more than two pounds avoirdupois and confined to a study of one particular and not very common disease, may expect its digestion to be a matter more suited to the struthionine capacities of a professional reviewer than to his own, and prefer to restrict his activities to the more mundane and obviously useful practice of refraction and cataract surgery. To some extent he would be right for, in so far as aetiology and treatment are concerned, he will find here no more valid conclusions than in any up-to-date text-book of ophthalmology.

And yet, in its way, this book is of great value. It is based on a personal study of 236 cases, 36 of which have been subjected to histopathological examination; the author has also summarized the literature and gives references to no less than 712 books and articles on the disease published between 1846 and 1949. After brief sections on nomenclature and history, the clinical details, including those of age, sex, racial, familial and regional occurrences, are discussed exhaustively with many tables of statistics summarized from the literature. Then follow sections on the histopathology, aetiology, and therapy of the disease, in each of which the findings and opinions of earlier workers are fully discussed and illuminated by the author's own rich experience. The book lacks an index and yet it is so admirably set out that any point to which one may wish to refer may easily be traced by reference to the list of contents at the beginning.

We feel that the author is warmly to be congratulated. In all branches of science a monograph such as this, which not only cut-across the rapidly-flowing stream of learning by giving an authoritative picture of the present state of knowledge, but also summarizes the various contributions made by rivulets and tributaries to the main stream, is of great value to the serious student. This is a work which, while it will not necessarily find a place in every oculist's personal library, will be indispensable to even the smallest ophthalmic unit with a library of its own, and is one to which any earnest student and investigator of this disease will turn with gratitude and respect.

CORRECTION

The review of A. Seymour Philps' book "Ophthalmic Operations" which appeared in the November issue (**34**, 705) contained an unfortunate inaccuracy. The reviewer wrote "in giving the complications after cataract extraction the author has omitted to mention expulsive haemorrhage". This complication is, however, discussed under a subtitle of its own on p. 234.

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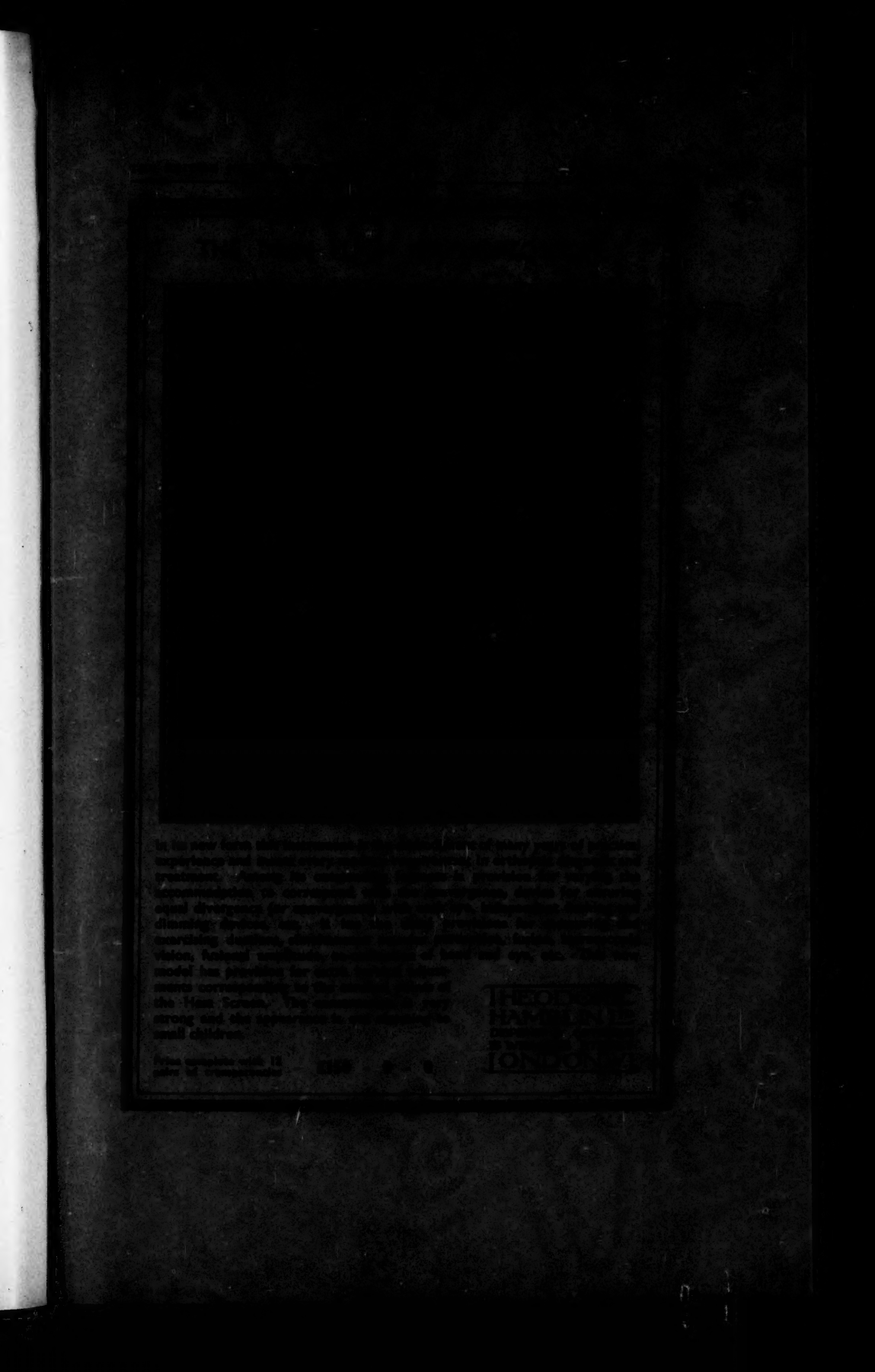
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